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# United States Patent [19]

Mitsui et al.

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## [54] HOSE COUPLING STRUCTURE

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## [56] References Cited

## U.S. PATENT DOCUMENTS

2,314,315 3/1943 Scheele .  
 3,291,507 12/1966 Clay ..... 285/114  
 4,258,935 3/1981 Rodrigo et al. .... 285/423 X  
 4,558,889 12/1985 Gans ..... 285/423 X  
 4,718,700 1/1988 Horch et al. .... 285/423 X  
 4,790,573 12/1988 Cardozo ..... 285/423 X  
 4,848,801 7/1989 Grabowski ..... 285/21  
 4,852,914 8/1989 Lyall ..... 285/21

4,955,970 9/1990 Kivi ..... 285/149  
 5,033,775 7/1991 Matte ..... 285/156 X  
 5,060,983 10/1991 Lee ..... 285/423 X

## FOREIGN PATENT DOCUMENTS

0286973 10/1988 European Pat. Off. .  
 1523331 3/1967 France .

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[57]

## ABSTRACT

In order to easily automate the coupling work of a pipe and a hose without damaging the mechanical strength of the structure, a hose with a coupling portion includes a nipple, a hose inserted into the end portion of the nipple, and a resin covering portion integrally covering the coupled portion of the hose and the pipe, the hose being previously configured to include a general part having an inner diameter equal to that of the nipple, a first enlarged part having a diameter enlarged at the fore end of the general part, the inner diameter of the enlarged part being smaller than the outer diameter of the nipple, and a second enlarged part having an inner diameter which gradually increases starting from the fore end of the first enlarged part and becoming larger than the outer diameter of the nipple, the first and second enlarged parts being applied to the nipple.

8 Claims, 4 Drawing Sheets

